

REMARKS

Claims 1-3 and 5-15 are presented for examination. Claims 1, 5, 6, 10 and 11 have been amended. Claims 1 and 6 are independent. Favorable reconsideration is requested.

Claims 1-3 and 6-15 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 1 and 6, the only claims with respect to which the Examiner raised specific points of objection hereunder, have been amended accordingly. This rejection is therefore respectfully requested to be withdrawn.

Claims 1-3, 6-10 and 15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,263,250 (*Nishiwaki et al.*).

Claims 5 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nishiwaki et al.*.

Claims 12 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nishiwaki et al.* in view of JP 2-187346 (JP '346).

Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nishiwaki et al.* in view of U.S. Patent No. 5,548,894 (*Muto*).

Applicants respectfully traverse the rejections under 35 U.S.C. §§ 102 and 103.

Claim 1 is directed to a method for processing an ink discharge port of an ink jet head provided with discharge ports for discharging ink, the discharge ports being provided at respective discharge port positions on a discharge port plate. The method comprises the steps of closely contacting a mask plate having openings corresponding to the discharge ports with a face of the discharge port plate on an ink discharge side, and

forming the discharge port on the discharge port plate by irradiating plural high energy ultraviolet beams simultaneously through the mask plate so that the beams are inclined with respect to a vertical axis that is perpendicular to the mask plate. According to the method, the plural beams are simultaneously irradiated at a single discharge port position of the discharge port plate to form the discharge port and are incident at the single discharge port position from different directions, and the formed discharge port has a shape that widens in a direction away from a source of the beams.

Nishiwaki et al. relates to a method of manufacturing a nozzle plate for an ink jet printer. According to the method, a plurality of elongated beams are generated by dividing a laser beam, and the beams are applied to a fly-eye lens array, which further divides the beams into a plurality of elongated secondary beams. The secondary beams are bundled on a diaphragm to form a beam pattern, which is irradiated onto a nozzle plate through a mask. The method also involves several other optical elements such as prisms 61a and 61b to constitute a beam splitter, a condenser lens 10, and a projecting lens 14. The fly-eye lens array itself is composed of a number of optical or lens elements.

In regard to Claim 1, the Office Action (page 3) cites *Nishiwaki et al.* as teaching, *inter alia*, “forming the discharge port on the discharge port plate by irradiating a high energy ultraviolet excimer laser simultaneously through the mask plate so that the laser is inclined with respect to a vertical axis that is perpendicular to the mask plate” and the “beams approach the discharge port plate 12 to a particular region from different directions.” However, even if *Nishiwaki et al.* be deemed to teach that a plurality of beams are irradiated from different directions, inclined with respect to a vertical axis

perpendicular to a mask plate, to form a plurality of discharge ports, Applicants submit that nothing in *Nishiwaki et al.* would teach or suggest that plural beams are simultaneously irradiated at a single discharge port position of a discharge port plate to form a discharge port, and are incident at the single discharge port position from different directions.

JP '346 relates to an ink jet recording head and its manufacture. According to *JP '346*, laser beams are projected onto orifice plate 10 via mask 4 from an ink channel side, and the laser beams are converged by tilting with respect to optical axis 13. The formed orifices are tapered in shape so as to narrow in the direction of ink discharge. Applicants note that optical axis 13 is not perpendicular to mask 4 (see Figs. 4 and 6), and that the formed orifices do not widen in a direction away from the source of the laser beams (see Figs. 4 and 6).

JP '346 is cited in the Office Action (page 4) as teaching “an ink jet head in which corresponding ink flow paths 14 (in Fig. 9) are rectangular in shape and are connected to a discharge port plate 10,” and “the discharge port plate is made of a resin material, which is ablated by laser beams to form the discharge ports 11, and . . . the rectangular ink flow paths 14 are formed by the laser beams after the discharge ports are formed.”

Muto relates to an ink jet head having ink-jet holes partially formed by laser-cutting and a method of manufacturing the same. According to *Muto*, a blank for a nozzle plate is formed by injection molding, and blind holes are formed in one of two opposite surfaces of the blank. The cross-sectional area of the blind holes decreases in a direction from the one opposite surface to the other. The blank is subjected to laser-cutting to

prepare the nozzle plate having orifice holes which cooperate with the blind holes to form ink-jet holes.

Muto is cited in the Office Action (page 5) as teaching that “forming discharge port plates (nozzle plate 61) can be accomplished by conventional, art recognized equivalent materials of either resin or silicon nitride.”

X (Applicants submit that neither *JP '346* nor *Muto* cures the deficiencies of *Nishiwaki et al.* discussed above.

In conclusion, Applicants submit that none of the cited references, whether taken singly or in combination (even assuming, for the sake of argument, that such combination were permissible), contains all of the elements of Claim 1. Accordingly, Claim 1 is believed patentable over the cited art. Since Claim 6 recites features similar to those of Claim 1, Claim 6 is believed patentable over the cited art for at least the same reasons.

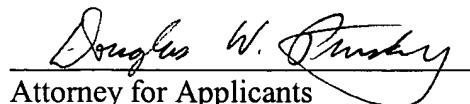
A review of the other art of record has failed to reveal anything which, in Applicants’ opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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